Docket No.: HK-0795

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Before the Board of Patent Appeals and Interferences

Applic. No.	:	10/811,475	Confirmation No.: 1760
Inventor	:	Michael Hansen, et al.	
Filed	:	March 24, 2004	
Title	:	Grey Value Correction Method for Binary Image Data	
TC/A.U.	:	2624	
Examiner	:	Soo Jin Park	
Customer No.	:	24131	

Hon. Commissioner for Patents
Alexandria, VA 22313-1450

BRIEF ON APPEAL

S i r :

This is an appeal from the final rejection in the Office action dated March 17, 2010, finally rejecting claims 1, 5-14 and 17-21.

Appellants submit this *Brief on Appeal* including payment in the amount of $540.00 to cover the fee for filing the *Brief on Appeal*.

Real Party in Interest:

This application is assigned to Heidelberger Druckmaschinen AG of Heidelberg, Germany. The assignment was recorded under Reel/Frame Nos. 015161 / 0434 on March 24, 2004.

Related Appeals and Interferences:

No related appeals or interference proceedings are currently pending which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

Status of Claims:

Claims 1, 5-14 and 17-21 are rejected and are under appeal. Claims 2-4 and 15-16 were cancelled.

Status of Amendments:

No claims were amended after the final Office action. A *Notice of Appeal* was filed on June 17, 2010.

Summary of the Claimed Subject Matter:

The subject matter of each independent claim is described in the specification of the instant application. Examples explaining the subject

matter defined in each of the independent claims, referring to the specification by page and line numbers, and to the drawings, are given below.

Independent claim 1:

A method for gray value correction of binary image data with a local grey value by a desired correction magnitude **[Fig. 5; page 17, line 7 – page 18, line 8]**, which comprises:

quantizing the binary image data with n bits **[S1 of Fig. 5]**, wherein n > 1 **[page 10, lines 11 – 19; page 17, lines 7 - 11]**;

filtering the quantized image data with a low-pass filter having a filter window smaller than a screen cell **[S2 of Fig. 5] [page 17, lines 11 - 13]**;

providing the low-pass filter with an asymmetrical distribution of filter coefficients with respect to the filter window **[page 17, lines 13 - 15]**;

obtaining the asymmetrical distribution of the filter coefficients from a symmetrical filter by shifting a filter function by fractions of an image point , said fractions being less than 1 , and obtaining further coefficients for the asymmetrical distribution by using the same filter

function as used for obtaining symmetrical distributions **[5 of Fig. 3; Table (2)] [page 12, lines 5 - 14]**; and

obtaining corrected quantized image data from the filtered image data with a threshold value operation **[S4 of Fig. 5] [page 17, line 23 – page 18, line 2]**.

Independent claim 5:

A method for gray value correction of binary image data with a local grey value by a desired correction magnitude **[Fig. 5; page 17, line 7 – page 18, line 8]**, which comprises:

quantizing the binary image data with n bits **[S1 of Fig. 5]**, wherein n > 1 **[page 10, lines 11 – 19; page 17, lines 7 - 11]**;

filtering the quantized image data with a low-pass filter having a filter window smaller than a screen cell **[S2 of Fig. 5] [page 17, lines 11 - 13]**;

asymmetrically distributing the filter coefficients of the low-pass filter with respect to the filter window **[page 17, lines 13 - 15]**;

obtaining the asymmetrical distribution of the filter coefficients from a symmetrical filter by shifting a filter function by fractions of an

image point, said fractions being less than 1, and obtaining further coefficients for the asymmetrical distribution by using the same filter function as used for obtaining symmetrical distributions **[5 of Fig. 3; Table (2)] [page 12, lines 5 - 14]**; and

obtaining corrected quantized image data from the filtered image data with a threshold value operation **[S4 of Fig. 5] [page 17, line 23 – page 18, line 2]**.

<u>Independent claim 14 reads as follows:</u>

A method for gray value correction of screened image data with a local grey value by a desired correction magnitude **[Fig. 5; page 17, line 7 – page 18, line 8]**, which comprises:

quantizing the binary image data with n bits **[S1 of Fig. 5]**, wherein $n > 1$ **[page 10, lines 11 – 19; page 17, lines 7 - 11]**, such that, in a three dimensional representation, the quantized binary image data forms a plateau having vertical flanks **[Fig. 1] [page 11, lines 4 – 8]**;

filtering the quantized image data with a low-pass filter having a filter window smaller than a screen cell **[S2 of Fig. 5] [page 17, lines 11 - 13]**, such that, in the three dimensional representation, the slopes

of the vertical flanks are reduced by the filtering **[Fig. 2] [page 12, lines 16 – 20]**; and

asymmetrically distributing the filter coefficients of the low-pass filter with respect to the filter window **[page 17, lines 13 - 15]**;

obtaining the asymmetrical distribution of the filter coefficients from a symmetrical filter by shifting a filter function by fractions of an image point, said fractions being less than 1, and obtaining further coefficients for the asymmetrical distribution by using the same filter function as used for obtaining symmetrical distributions **[5 of Fig. 3; Table (2)] [page 12, lines 5 - 14]**; and

performing a threshold value operation to obtain corrected quantized image data from the filtered image data **[S4 of Fig. 5] [page 17, line 23 – page 18, line 2]**.

Grounds of Rejection to be Reviewed on Appeal

1. Whether or not claims 1, 5, and 14 are obvious over U. S. Patent No. 6,002,845 to Honma in view of U. S. Patent No. 6,907,144 to Gindele under 35 U.S.C. § 103(a).

2. Whether or not claims 6-11 and 17-20 are obvious over Honma and Gindele further in view of U. S. Patent No. 6,717,601 to Sanger under 35 U.S.C. § 103(a).

3. Whether or not claims 12 - 13 and 21 are obvious over Honma and Gindele, further in view of U. S. Patent No. 7,079,289 to Loce et al., under 35 U.S.C. § 103(a).

<u>Argument</u>:

I. Whether or not claims 1, 5, and 14 are obvious over U. S. Patent No. 6,002,845 to Honma in view of U. S. Patent No. 6,907,144 to Gindele under 35 U.S.C. § 103(a).

On page 2 of the Office Action dated March 17, 2010 (the "Office Action"), claims 1, 5 and 14 were rejected under 35 U.S.C. § 103(a) as allegedly being obvious over U. S. Patent No. 6,002,845 to Honma ("**HONMA**") in view of U. S. Patent No. 6,907,144 to Gindele ("**GINDELE**").

Appellants respectfully traverse the above rejections.

More particularly, the combination of **GINDELE** and **HONMA** cited on page 2 of the Office Action does not teach or suggest, among other things, Appellants' particularly claimed methods for grey value correction.

In particular, one result of Appellants' claimed invention is that the claimed grey value correction method of the instant invention is **suitable for exposure linearization of recording devices**. This is pointed out on page 5 of the instant application, line 24- page 6, line 4, which states:

> It is accordingly an object of the invention to provide a grey value correction method for binary image data that overcomes the hereinafore-mentioned disadvantages of the heretofore-known devices and methods of this general type **and that is suitable for the exposure linearization of recording devices** and generally for correcting the graduation of binary image data and that avoids the disadvantages of the known methods. [emphasis added by Appellants]

The **HONMA** reference describes an image processing apparatus for storing image information of a plurality of pages, for example, a digital copier apparatus. See, for example, col. 1 of **HONMA**, lines 9 – 11 and 13 – 17. Resultantly, the method disclosed in **HONMA** uses a smoothing unit (305 of Fig. 3 of **HONMA**) that smoothes the image read

by a CCD sensor (109 of Fig. 2 of **HONMA**) of an image reading unit (201 of Fig. 2 of **HONMA**), together with image data read from an image storage unit (304 of Fig. 3 of **HONMA**). See, for example, col. 4 of **HONMA**, lines 16 – 29 and col. 5 of **HONMA**, lines 43 - 47.

In order to reduce the amount of image data sent to the memory for storage, **HONMA** discloses converting the multi-value density data to **binary** data (i.e., into a one-bit image data "0" or "1" representing a density value of either "0" or "255"). See, for example, col. 4 of **HONMA,** lines 55 – 59, which state:

> The density data is then sent to a binarization unit 302 **which binarizes multi-value density data to obtain a density value of "0" or "255"**. The binarized 8-bit image data is converted <u>**into one-bit image data "0" or "1"**</u> **to reduce the amount of image data to be stored in a memory**. [emphasis added by Appellants]

The binarization of **HONMA** is performed in the binarization unit 302 of Fig. 3 of **HONMA.** Because the image data read from the CCD 109 is smoothed**,** the stored image data of **HONMA** must be smoothed in the same way. Thus, in **HONMA,** both the stored image data and the read image data are sent to the smoothing unit 305 for conversion to one of

the two binary density values “0” or “255”. See, for example, col. 5 of **HONMA**, lines 43 – 47, which state:

> The image data read from the image storage unit 304 **and** the image data not stored in the image storage unit **are sent to a smoothing unit 305 which first converts one-bit data into 8-bit data and then change the image data to a density value "0" or "255".** [emphasis added by Appellants]

In order to recover the halftone information, **HONMA** discloses making a “pseudo-halftone representation” in reverse, using binary data, as disclosed in col. 4 of **HONMA**, lines 60 – 67. Such a method is disclosed in col. 5 of **HONMA**, lines 43 – 57. **HONMA** then discloses smoothing the halftoned image. However, this smoothing of **HONMA** has **nothing** to do with **a grey value correction of binary image data,** as claimed by Appellants.

More particularly, as discussed above, **HONMA** discloses a method for creating halftone image data out of pseudo-halftone image data represented by **1-bit image data**. However, changing the number “1” into a density value of “255” number, as done in **HONMA**, is **not** the same as, or analogous to, quantizing with n>1, as required by Appellants’ claims. See, for example, Appellants’ claim 1, which recites, among other limitatations”

quantizing the binary image data with n bits, wherein $n > 1$;

Thus, in contrast to the allegations made on page 2 of the Office Action, the **HONMA** reference does **not** teach or suggest, quantizing the binary image data with n bits, wherein $n > 1$, as required by Appellants' claims.

Additionally, the Office Action asserted a combination of the **HONMA** reference and the **GINDELE** reference against Appellants' independent claims. Appellants respectfully traverse this rejection.

In **contrast** to the teachings of **HONMA**, the **GINDELE** reference discloses a method for removing noise using a Sigma filter that compares the values of the pixels in a sample region with a pixel of interest, wherein only pixels above a threshold value are taken into account when calculating the value of the pixel of interest. However, the **HONMA** reference discloses changing "nearby" pixels by adding them to weighted coefficients of a matrix. See, for example, col. 5 of **HONMA**, lines 9 – 14.

Thus, according to the teachings of **GINDELE** (i.e., only pixels above a threshold), the changes in **HONMA** that represent the binary values in a “pseudo-halftone” manner would be interpreted as noise and would, therefore, be cut off. The information of the halftone values of **HONMA** would be **discarded** in accordance with the teachings of **GINDELE,** thus rendering the device of **HONMA** inoperative. M.P.E.P. § 2143.01(V) states, in part:

> V. THE **PROPOSED MODIFICATION CANNOT RENDER THE PRIOR ART UNSATISFACTORY FOR ITS INTENDED PURPOSE**
>
> If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.

Thus, M.P.E.P. § 2143.01(V) states that if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. As discussed hereinabove, taking the teachings of the **HONMA** reference in combination with the teachings of the **GINDELE** reference would impermissibly render the device of the **HONMA** reference inoperative, and thus, unsatisfactory for its intended purpose. Thus, under M.P.E.P. § 2143.01(V), Applicant’s claims are **not** obvious over the **HONMA** reference taken in

combination with the **GINDELE** reference. In fact, the combination of the teachings of **HONMA** and **GINDELE** produces a device that does not operate in accordance with the principles of the **HONMA** reference. Thus, the **HONMA** reference is not combinable with the **GINDELE** reference in the manner set forth in the Office Action.

Further, the **GINDELE** reference discloses a method of **<u>noise reduction</u>**, in contrast to Appellants' claimed method of grey value correction. In particular, the **GINDELE** reference discloses **a distribution of pixel regions** and **<u>not</u> a distribution of filter coefficients**. See, for example, col. 6 of **GINDELE**, lines 3 – 4.

Further, in **GINDELE,** the filter weighting coefficients all only consist of either a "l" or a "0". See, for example, col. 6 of **GINDELE**, lines 44 – 47 ("Each pixel in the sparsely sampled local region is given a weighting factor of one or zero based on the absolute difference between the value of the pixel of interest and the sampled pixel value"). Therefore, in **GINDELE**, no filter coefficients are changed in any way. Rather, as can be seen from Fig. 10 of **GINDELE**, read together with the description in col. 8 of **GINDELE**, line 63 – col. 9, line 2, in **GINDELE**, the whole pixel regions are moved by **<u>one whole pixel</u>** relative to the

pixel regions in Fig. 8 of **GINDELE**. Therefore **GINDELE** does not teach or suggest a **shifting of a fraction being <u>less than 1</u>**, as required by Appellants' claims, but rather specifically teaches a shift of **<u>exactly 1</u>** pixel.

Thus, among other limitations of Appellants' claims, **GINDELE** does **<u>not</u>** teach or suggest obtaining the asymmetrical distribution of the filter coefficients from a symmetrical filter **by shifting a filter function by fractions of an image point, said fractions being less than 1,** and obtaining further coefficients for the asymmetrical distribution **by using the same filter function** as used for obtaining symmetrical distributions, as required by Appellants' claims. As acknowledged on page 3 of the Office Action, **HONMA** also fails to teach or suggest the above limitation of Appellants' claims. As such, the combination of **GINDELE** and **HONMA** also does **<u>not</u>** teach or suggest the above-limitation of Appellants' claims, among other limitations.

Also, among other things, **GINDELE** does **<u>not</u>** teach or suggest obtaining an asymmetrical distribution of filter coefficients, as required by Appellants' claims. Rather, **GINDELE** discloses an asymmetrical

distribution of pixel regions in a sparsely sampled local region. See, for example, Fig. 10 of **GINDELE** and col. 8 of **GINDELE**, lines 65 – 67.

As pointed out above, Appellants' claimed invention requires a distribution of <u>**filter coefficients**</u> as points in a matrix, with an asymmetrical distribution of the filter coefficients formed **by shifting the filter function by <u>fractions</u> of an image point <u>less than 1</u>**. Therefore, as disclosed on pages 11 - 12 of the instant application, all matrix elements remain set, but the values differ in an asymmetrical way with regard to a filter function by using the filter function itself and filling in values which deviate <u>**by a fraction of 1**</u> from the original distribution.

Therefore, in Appellants' claimed invention, the values of the filter coefficients, themselves, are changed. See, for example, page 12 of the instant application. However, **GINDELE** only discloses a sparsely sampled region with pixels, wherein the pixels in the pixel regions themselves are shifted <u>**by an amount of 1**</u> (i.e., and not by <u>**fractions less than 1**</u>, as required by Appellants' claims).

Thus, in contrast to the allegation made on page 3 of the Office Action, the **GINDELE** reference does <u>**not**</u> teach or suggest obtaining an

asymmetrical distribution of filter coefficients from a symmetrical filter by shifting the filter function by fractions of an image point less than 1, as required by Appellants' claims.

In summary, the **GINDELE** and **HONMA** references are not combinable to teach, suggest or motivate a person of ordinary skill in the art to derive Appellants' particularly claimed invention. First, the **HONMA** and **GINDELE** references cannot be combined without **destroying** the operability of the **HONMA** reference.

Further, as discussed above, neither **HONMA,** nor **GINDELE** teaches or suggests, among other limitations of Appellants' claims, obtaining the asymmetrical distribution of the filter coefficients from a symmetrical filter by shifting a filter function **by fractions of an image point**, **said fractions being less than 1**, especially where further coefficients for the asymmetrical distribution are obtained. In contrast to Appellants' claimed invention, **GINDELE** only discloses shifting **whole pixels** in a sparsely sampled local region.

For the foregoing reasons, among others, Appellants' claims are believed to be patentable over the **HONMA** and **GINDELE** references.

The **SANGER** and **LOCE** references, cited in the Office Action in combination with **HONMA** and **GINDELE** against certain of Appellants' dependent claims, do not cure the above-discussed deficiencies of the **HONMA** and **GINDELE** references.

II. Whether or not claims 6-11 and 17-20 are obvious over Honma and Gindele further in view of U. S. Patent No. 6,717,601 to Sanger under 35 U.S.C. § 103(a).

On page 4 of the Office Action, claims 6 - 11 and 17 - 20 were rejected under 35 U.S.C. § 103(a) as allegedly being obvious over **HONMA** in view of **GINDELE,** and further in view of U. S. Patent No. 6,717,601 to Sanger ("**SANGER**").

Appellants respectfully traverse the above rejections.

More particularly, the dependent claims 6 – 11 and 17 – 20 are believed to be patentable over the **HONMA** and **GINDELE** references, for at least the reasons discussed in Section I, above, among other reasons. More particularly, the dependent claims 6 – 11 and 17 – 20 are believed to be patentable as well because they all are ultimately dependent on claims 1 or 14. The **SANGER** reference, cited in the

Office Action in combination with **HONMA** and **GINDELE** against Appellants' claims, does not cure the deficiencies of the **HONMA** and **GINDELE** references, as discussed in Section I, above.

III. Whether or not claims 12, 13 and 21 are obvious over Honma and Gindele further in view of U. S. Patent No. 7,079,289 to Loce et al., under 35 U.S.C. § 103(a).

On page 6 of the Office Action, claims 12, 13 and 21 were rejected under 35 U.S.C. § 103(a) as allegedly being obvious over **HONMA** in view of **GINDELE,** and further in view of U. S. Patent No. 7,079,289 to Loce et al ("**LOCE**").

Appellants respectfully traverse the above rejections.

More particularly, the dependent claims 12 – 13 and 21 are believed to be patentable over the **HONMA** and **GINDELE** references, for at least the reasons discussed in Section I, above, among other reasons. More particularly, the dependent claims 12 – 13 and 21 are believed to be patentable as well because they all are ultimately dependent on claims 1 or 14. The **LOCE** reference, cited in the Office Action in combination with **HONMA** and **GINDELE** against Appellants' claims, does not cure

the deficiencies of the **HONMA** and **GINDELE** references, as discussed in Section I, above.

IV. Conclusion.

It is accordingly believed that none of the references, whether taken alone or in any combination, teach or suggest the features of claims 1, 5 and 14. Claims 1, 5 and 14 are, therefore, believed to be patentable over the art. The dependent claims are believed to be patentable as well because they all are ultimately dependent on claims 1 or 14.

The honorable Board is therefore respectfully urged to reverse the rejection of the Primary Examiner.

If an extension of time is required for this submission, petition for extension is herewith made. Any fees due should be charged to Deposit Account No. 12-1099 of Lerner Greenberg Stemer LLP.

Respectfully submitted,

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Claims Appendix:

1. A method for gray value correction of binary image data with a local grey value by a desired correction magnitude, which comprises:

quantizing the binary image data with n bits, wherein n > 1;

filtering the quantized image data with a low-pass filter having a filter window smaller than a screen cell;

providing the low-pass filter with an asymmetrical distribution of filter coefficients with respect to the filter window;

obtaining the asymmetrical distribution of the filter coefficients from a symmetrical filter by shifting a filter function by fractions of an image point, said fractions being less than 1, and obtaining further coefficients for the asymmetrical distribution by using the same filter function as used for obtaining symmetrical distributions; and

obtaining corrected quantized image data from the filtered image data with a threshold value operation.

5. A method for gray value correction of binary image data with a local grey value by a desired correction magnitude, which comprises:

quantizing the binary image data with n bits, wherein n > 1;

filtering the quantized image data with a low-pass filter having a filter window smaller than a screen cell;

asymmetrically distributing the filter coefficients of the low-pass filter with respect to the filter window;

obtaining the asymmetrical distribution of the filter coefficients from a symmetrical filter by shifting a filter function by fractions of an image point, said fractions being less than 1, and obtaining further coefficients for the asymmetrical distribution by using the same filter function as used for obtaining symmetrical distributions; and

obtaining corrected quantized image data from the filtered image data with a threshold value operation.

6. The method according to claim 1, which further comprises carrying out the threshold value operation with a threshold value selected as a function of the local gray value and of the desired correction magnitude.

7. The method according to claim 6, which further comprises storing threshold values in a threshold value table.

8. The method according to claim 1, which further comprises:

carrying out the threshold value operation with threshold values selected as a function of the local gray value and of the desired correction magnitude; and

storing the threshold values in a threshold value table.

9. The method according to claim 6, which further comprises determining a threshold value function T1 = f1(G,dG) empirically based upon model screen dots and obtaining a threshold value function T2 = f2(G,dG) therefrom with approximation functions.

10. The method according to claim 7, which further comprises determining a threshold value function T1 = f1(G,dG) empirically based upon model screen dots and obtaining a threshold value function T2 = f2(G,dG) therefrom with approximation functions.

11. The method according to claim 8, which further comprises determining a threshold value function T1 = f1(G,dG) empirically based upon model screen dots and obtaining a threshold value function T2 = f2(G,dG) therefrom with approximation functions.

12. The method according to claim 1, which further comprises obtaining corrected binary image data from the corrected quantized image data by quantization with 1 bit.

13. The method according to claim 1, which further comprises quantizing the corrected quantized image data with 1 bit to obtain corrected binary image data.

14. A method for gray value correction of screened image data with a local grey value by a desired correction magnitude, which comprises:

quantizing the binary image data with n bits, wherein n > 1, such that, in a three dimensional representation, the quantized binary image data forms a plateau having vertical flanks;

filtering the quantized image data with a low-pass filter having a filter window smaller than a screen cell, such that, in the three dimensional representation, the slopes of the vertical flanks are reduced by the filtering; and

asymmetrically distributing the filter coefficients of the low-pass filter with respect to the filter window;

obtaining the asymmetrical distribution of the filter coefficients from a symmetrical filter by shifting a filter function by fractions of an image point, said fractions being less than 1, and obtaining further coefficients for the asymmetrical distribution by using the same filter function as used for obtaining symmetrical distributions; and

performing a threshold value operation to obtain corrected quantized image data from the filtered image data.

17. The method according to claim 14, which further comprises carrying out the threshold value operation with a threshold value selected as a function of the local gray value and of the desired correction magnitude.

18. The method according to claim 17, which further comprises storing threshold values in a threshold value table.

19. The method according to claim 17, which further comprises determining a threshold value function T1 = f1(G,dG) empirically based upon model screen dots and obtaining a threshold value function T2 = f2(G,dG) therefrom with approximation functions.

20. The method according to claim 18, which further comprises determining a threshold value function T1 = f1(G,dG) empirically based upon model screen dots and obtaining a threshold value function T2 = f2(G,dG) therefrom with approximation functions.

21. The method according to claim 14, which further comprises quantizing the corrected quantized image data with 1 bit to obtain corrected binary image data.

Evidence Appendix:

No evidence pursuant to §§ 1.130, 1.131, or 1.132 or any other evidence has been entered by the Examiner and relied upon by appellant in the appeal.

Related Proceedings Appendix:

No prior or pending appeals, interferences or judicial proceedings are in existence which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in this appeal. Accordingly, no copies of decisions rendered by a court or the Board are available.